



US009636818B2

(12) **United States Patent**
Kierspe et al.

(10) **Patent No.:** **US 9,636,818 B2**
(45) **Date of Patent:** ***May 2, 2017**

(54) **MULTI-SPEED CYCLOIDAL TRANSMISSION**

2200/0034 (2013.01); F16H 2200/0039
(2013.01); F16H 2200/2007 (2013.01)

(71) Applicant: **Techtronic Power Tools Technology Limited**, Tortola (VG)

(58) **Field of Classification Search**

None

See application file for complete search history.

(72) Inventors: **Addison C. Kierspe**, Moncks Corner, SC (US); **Kyle D. Turner**, Lexington, SC (US); **Kirton W. Neipp**, Mt. Pleasant, SC (US); **Leonid D. Kapanzhi**, Campobello, SC (US); **William C. Buck**, Clemson, SC (US)

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,177,695 A	12/1979	Grove
4,484,489 A	11/1984	Boutant
4,760,759 A	8/1988	Blake
5,044,643 A	9/1991	Nakamura

(Continued)

(73) Assignee: **TECHTRONIC POWER TOOLS TECHNOLOGY LIMITED**, Tortola (VG)

FOREIGN PATENT DOCUMENTS

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

EP	0063725	11/1982
EP	1364752	2/2010
WO	2011098923	8/2011

This patent is subject to a terminal disclaimer.

OTHER PUBLICATIONS

(21) Appl. No.: **14/926,776**

European Patent Search Report for Application No. 14190101.7 dated Apr. 7, 2015 (4 pages).

(22) Filed: **Oct. 29, 2015**

(65) **Prior Publication Data**

US 2016/0046012 A1 Feb. 18, 2016

Primary Examiner — Dirk Wright

(74) *Attorney, Agent, or Firm* — Michael Best & Friedrich LLP

Related U.S. Application Data

(63) Continuation of application No. 14/087,180, filed on Nov. 22, 2013, now Pat. No. 9,217,492.

(51) **Int. Cl.**

F16H 3/70 (2006.01)

B25F 5/00 (2006.01)

F16H 3/46 (2006.01)

(52) **U.S. Cl.**

CPC **B25F 5/001** (2013.01); **F16H 3/46**
(2013.01); **F16H 3/70** (2013.01); **F16H**

(57)

ABSTRACT

A transmission assembly for operably coupling an input member to an output member includes a first cycloidal gear stage having a first gear ratio and a second cycloidal gear stage having a second gear ratio different than the first gear ratio. The transmission assembly also includes a shifting mechanism for selectively driving the output member with one of the first cycloidal gear stage and the second cycloidal gear stage.

26 Claims, 7 Drawing Sheets

